

Pelvic Binder Radiography Detects Occult Instability in Cadaveric Simulated Lateral Compression Pelvic Ring Injuries

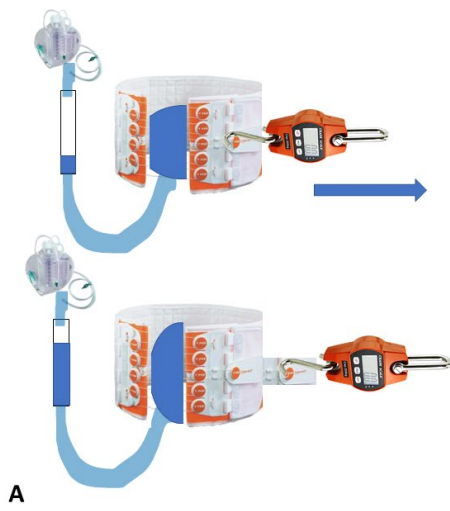
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Purpose: Occult instability in minimally displaced lateral compression (LC) pelvic ring injuries may have clinical relevance for treatment. We describe 2 novel LC pelvis fracture stress examinations, pelvic binder stress radiography (PBR) and pelvic stress bladder manometry (PBM), which do not require anesthesia, patient transport, or radiation of personnel.

Methods: A biomechanical study was performed with 5 fresh elderly cadavers. Sequential osteotomies of the pelvis simulated increasingly unstable LC pelvis fractures (OTA/AO 61A2.2, 61B1.1a, 61B1.1b, 61B2.1). Compressive force was quantitatively applied using a pelvic binder and scale. Pelvis fracture displacement was measured on AP and inlet fluoroscopic views. Bladder pressure was measured using a Foley catheter as a water column.

Results: Fracture displacement strongly correlated with force applied ($R^2 = 0.600-0.963$). PBR discriminated between simulated LC injuries. Mean displacement of 61B1.1b injuries >1 cm was observed at 3.8 kg on AP view and 5 kg on inlet view. Mean displacement of 61B1.1a injuries >1 cm was observed at 8.2 kg on AP view and 9.3 kg on inlet view. 61A2.2 injuries did not displace >1 cm at forces up to 10 kg. Over 95% of 61B1.1a and 61B1.1b injuries displaced >1 cm at 10 kg. Bladder pressure moderately correlated with force applied ($R^2 = 0.517-0.842$) and did not discriminate between LC injuries.

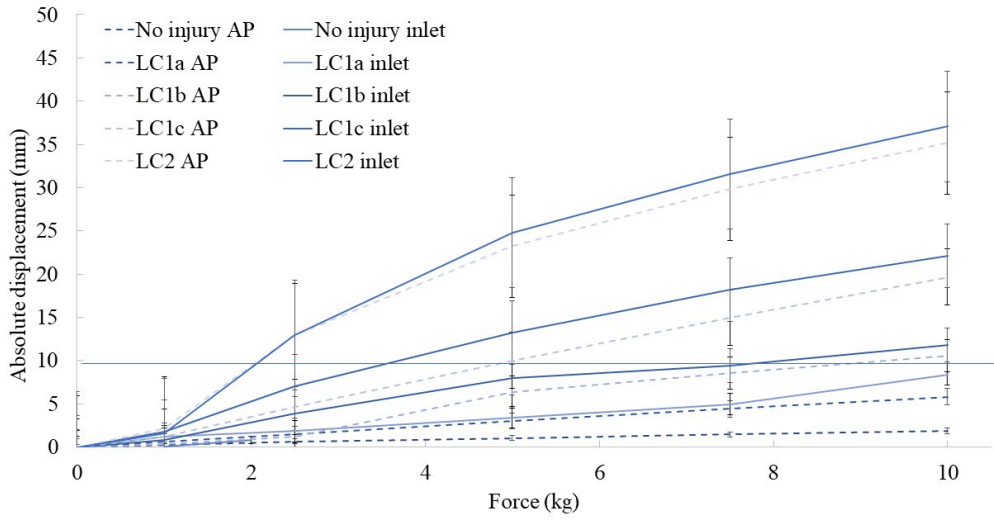
Conclusion: PBR is feasible, precisely quantified occult mechanical instability in simulated LC pelvis fractures in response to reproducible applied force, and discriminated between simulated LC pelvis fractures. PBM did not sufficiently discriminate between simulated LC fractures. Clinical validation of PBR for assessing occult instability in LC pelvis fracture is in progress (NCT05876871).



A

B

C



D

NEW TECHNIQUES

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device they wish to use in clinical practice.